

PERFORMANCE TEST ON 4-STROKE PETROL ENGINE WITH PURE OXYGEN

MANGI NAVEEN KUMAR¹, G. ABHILASH REDDY²,
G. MANOHAR NAIDU³ & C. SHIRISHA⁴

¹Assistant Professor, Mechanical Department, Guru Nanak Institute of Technology, Hyderabad, India

^{2,3,4} UG Students, Guru Nanak Institute of Technology, Hyderabad, India

ABSTRACT

Internal combustion engines are working by consuming the gasoline and air from the atmosphere. Due to more unwanted gases in air when combustion is taking place inside the cylinder it produces the more amounts of emissions from the exhaust. The problem is overcome by sending the pure oxygen into the internal combustion engine along with gasoline. It is by absence of remaining unwanted gases into engine cylinder the emissions are reduced from the exhaust. It also affects increase in power and torque of the engine and emissions from the exhaust will decrease. Also, it affects the improvement by adjusting the oxygen-fuel ratio in the carburetor.

KEYWORDS: Pure Oxygen, Internal Combustion Engine, Vacuum Chamber, Power & Torque

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INTRODUCTION

Most of the IC engines are running by utilizing the air-fuel mixture, due to these emissions from the engines is releasing more unwanted and UN combusted gases [1]. It will affect human as well as environmental pollution. It will restrict by sending the pure oxygen into the engine cylinder. The oxygen content in the air is varied 21% to 27% by using this amount of oxygen the combustion is going to take place [2]. Whereas remaining gases exhaust from the engine at high temperatures and these are polluting the environment by mixing with air. Due to this CO₂ content in the air, increasing periodically. The emissions exhausted from the engines are reduced by restricting the presence of unwanted gases into the engine cylinder. It determines the pure oxygen in the combustion chamber will affects the complete combustion by utilizing along with gasoline [3]. By using pure oxygen in combustion chamber power and torque of the engines are hikes; it is done by increasing the amount of oxygen into the engine cylinder. This causes the emissions exhausted from the combustion chamber are reduced due to absence of remaining gases at the time of combustion. Also the complete combustion will take place in engine cylinder [4]. The mileage of the vehicle also enhances by modifying the oxygen-fuel ration in the carburetor.

The small adjustment in the carburetor wills results, changes in vehicle mileage. It is done by increasing the length of the fuel adjustment screw. The increase order of oxygen amount will cause changes in the performance parameters in the engine cylinder. In this view we made some changes in supplying of oxygen into the engine cylinder, by creating the vacuum chamber.

WORKING METHODOLOGY

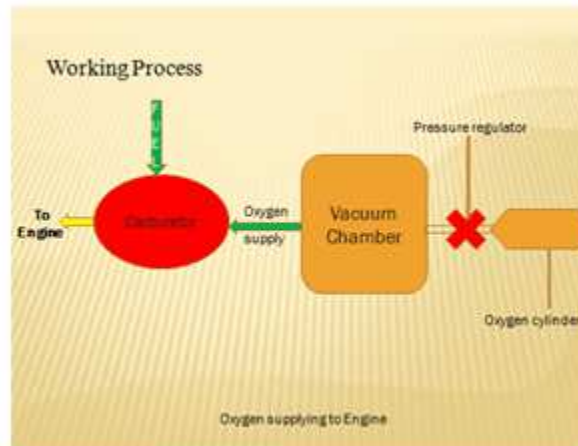


Figure 1: Oxygen Supply System to the Carburetor

Procedure

- Initially the cylinder connected to the vacuum chamber through the pipe which must resist the pressured oxygen coming from the cylinder.
- The cylinder equipped with the pressure regulator which will restrict the oxygen flow and it will release the oxygen at required pressure by adjusting the pressure regulator valves.
- The vacuum chamber having the rectangular shape and which will regulate the flow from an oxygen cylinder to the carburetor.
- The chamber made up of mild steel and which will resist the pressure up to 2bar, and the chamber having the two ports, one connects to the oxygen cylinder and another one to the carburetor at different diameters.
- A carburetor is a place where the fuel and oxygen will mix with each other and it will send to the engine cylinder for the combustion.
- The Carburettor Having the Different Modes of Mixtures:**
 - Rich mixture
 - Lean mixture
 - Stoichiometries ratio
- The modes will choose according to the weather conditions and engine conditions..., etc.
- When the vehicle climbing hill, mud, heavy load conditions..., etc. the rich mixture will use.
- For constant speed the stoichiometric ratio will increase the engine life as well as mileage of the vehicle.
- Down areas and some other conditions leans mixture will use.
- The oxygen supply to the engine also as well as an air supply system, but the storage of the oxygen is difficult.

- When the oxygen-fuel mixture enters into the engine it will burn completely and also 100% combustion will be done.
- Due to absence of remaining gas pollution will reduces completely and also knocking will be reduces.
- In the same scenario the mileage of the vehicle also increases.
- But the supply of the oxygen must be constant at any rate, if the supply is not regulated, there will be an explosion chances will occurs.

SOFTWARE REQUIREMENTS

A software (ANSYS) is required to perform the analysis on designing part. When the stress is applied on the designed rectangular box the deformation of the object is more at the edges of the box. The rectangular box can withstand up to 1.5bar of the pressure, it is slightly more than the atmospheric pressure.

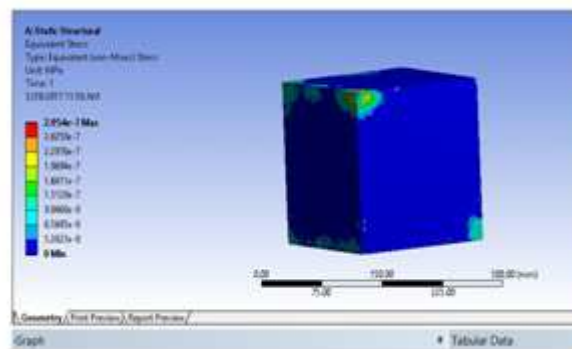


Figure 2: Analysis of Rectangular Box By Using the ANSYS Software

Fabrication Requirements

- The rectangular box made up with mild steel to pass the oxygen from the cylinder to the engine.
- The thickness of the plate is 2 mm and the area of the box is 15cm X 15cm, and the volume of the box is 15cm X 15cm X 15cm.
- The box is welded by the arc welding to get enough strength and to reduce the leakage problems of the oxygen.
- As well as both sides of the box is welded with two valves, one is connected to the carburetor and another one is connected to the oxygen cylinder.
- The valves are connected to the rectangular box by cutting the plate in the middle of the plate by referring the pipe diameter.



Figure 3: Vacuum Chamber

TESTING AND RESULTS



Figure 4: Testing Bike with Pure Oxygen

The power, torque of the engine increases more than the normal air pumped bike by using the pure oxygen into the combustion chamber also due to absence of remaining gases the emissions produced from the vehicle reduces. By adjusting the oxygen-fuel mixture we can increase the mileage of the vehicle. The remaining parameters of the vehicle like valve timings, temperatures, ignition timings..., etc. are same.

By using the following oxygen-fuel mixture we can increase mileage per liter:

Oxygen: Petrol - 0.5: 4.5 (approximately)

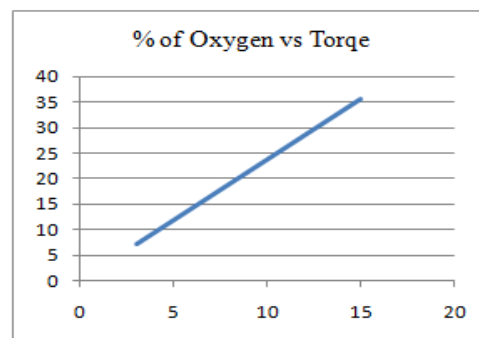


Figure 5: % of Oxygen Vs Torque

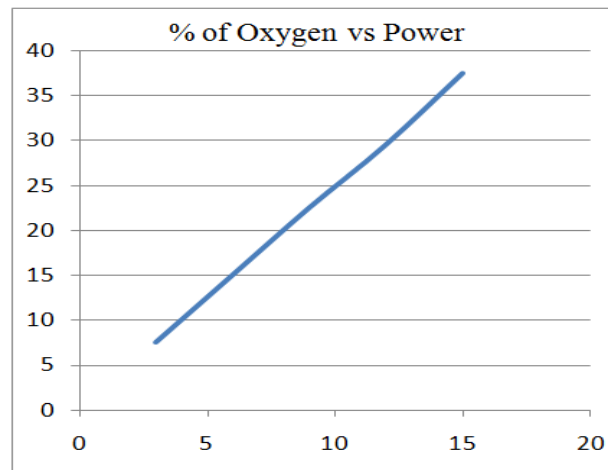


Figure 6: % of Oxygen Vs Power

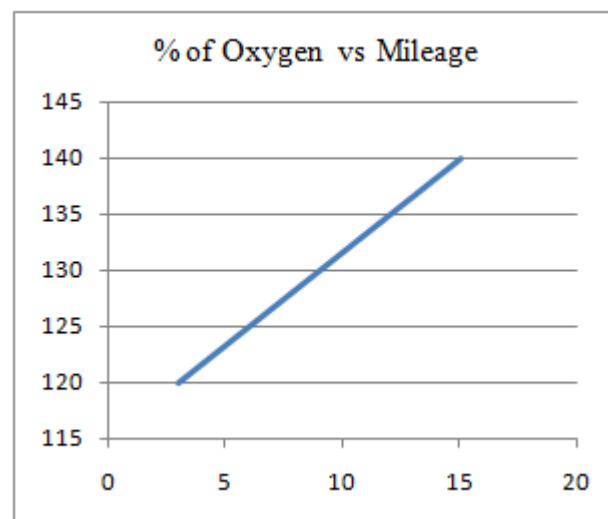


Figure 7: % of Oxygen vs Mileage

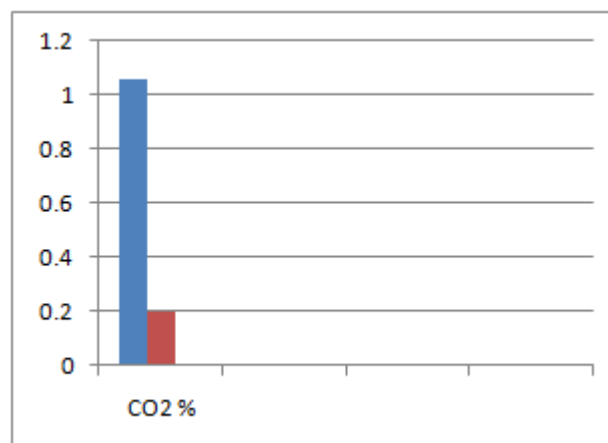


Figure 8: % of CO2 in General Bike Vs Oxy-Fuel Bike

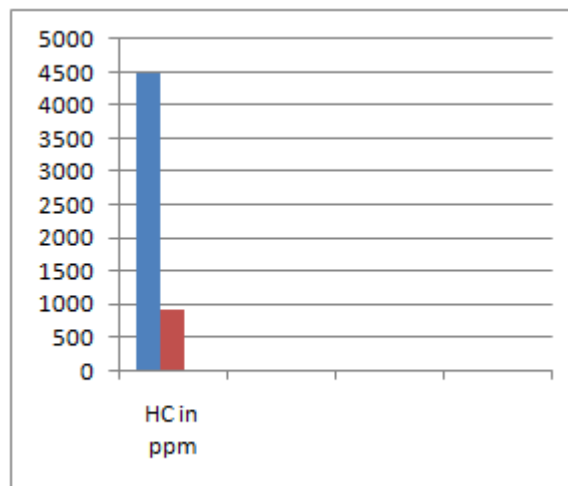


Figure 9: HC in General Bike Vs Oxy-Fuel Bike

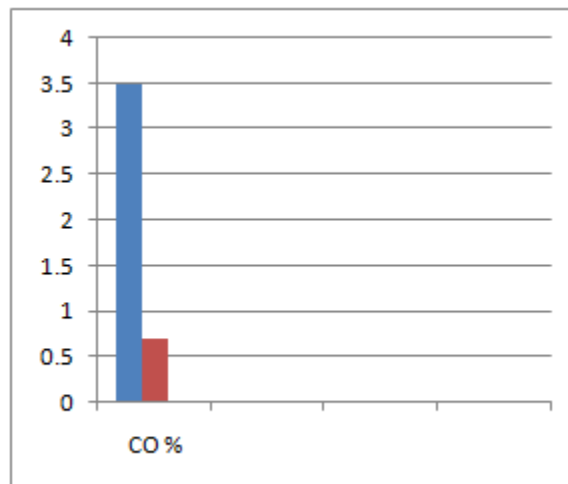


Figure 10: % of CO in General Bike Vs Oxy-Fuel Bike

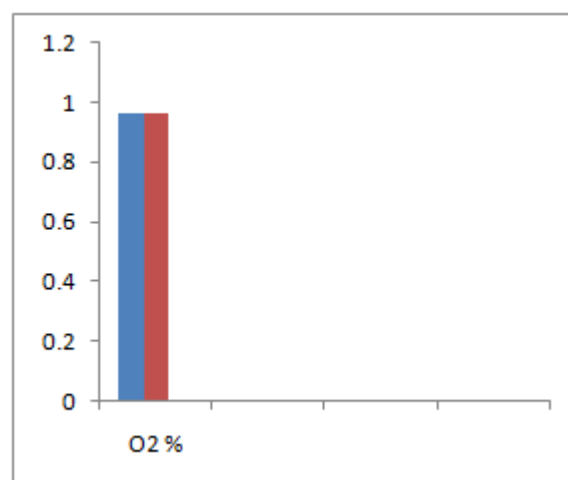


Figure 11: % of O2 in General Bike Vs Oxy-Fuel Bike

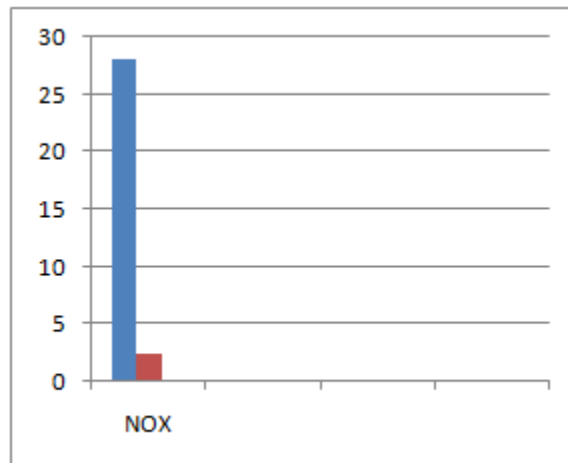


Figure 12: NOX in General Bike Vs Oxy-Fuel Bike

CONCLUSIONS

The bike was running successfully by sending the pure oxygen into the engine cylinder with the fuel mixture at proper Oxy-fuel mixture. The power, torque of the engines are increased and as well as the emissions produced from the engine are decreased due to absence of remaining other gases. The temperatures inside the engine are under controlling conditions by eliminating the unwanted gases; it will cause the increase in life of the engine cylinder and inside, knocking decreased by pumping the pure oxygen into the cylinder at proper conditions.

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